Iterators

Announcements

Iterators

Iterators

A container can provide an iterator that provides access to its elements in order

`iter(iterable)`: Return an iterator over the elements of an iterable value

`next(iterator)`: Return the next element in an iterator

```
>>> s = [3, 4, 5]
>>> t = iter(s)
>>> next(t)
3
>>> next(t)
4
>>> u = iter(s)
>>> next(u)
3
>>> next(t)
5
>>> next(u)
4
```

(Demo)

Dictionary Iteration

Views of a Dictionary

An *iterable* value is any value that can be passed to **iter** to produce an iterator

An *iterator* is returned from **iter** and can be passed to **next**; all iterators are mutable

A dictionary, its keys, its values, and its items are all iterable values

- The order of items in a dictionary is the order in which they were added (Python 3.6+)
- Historically, items appeared in an arbitrary order (Python 3.5 and earlier)

```
>>> d = {'one': 1, 'two': 2, 'three': 3}
>>> d['zero'] = 0
>>> k = iter(d.keys())  # or iter(d)
>>> next(k)
'one'
>>> next(k)
'two'
>>> next(k)
'three'
>>> next(k)
'zero'
```

```
>>> v = iter(d.values())
>>> next(v)
1
>>> next(v)
2
>>> next(v)
3
>>> next(v)
0
```

```
>>> i = iter(d.items())
>>> next(i)
('one', 1)
>>> next(i)
('two', 2)
>>> next(i)
('three', 3)
>>> next(i)
('zero', 0)
```

(Demo)

For Statements

(Demo)

Built-In Iterator Functions

Built-in Functions for Iteration

延时求值对象（是一种iterator）

Many built-in Python sequence operations return iterators that compute results lazily

```
map(func, iterable):          Iterate over func(x) for x in iterable
filter(func, iterable):       Iterate over x in iterable if func(x)
zip(first_iter, second_iter): Iterate over co-indexed (x, y) pairs
reversed(sequence):           Iterate over x in a sequence in reverse order
```

To view the contents of an iterator, place the resulting elements into a container

```
list(iterable):     Create a list containing all x in iterable
tuple(iterable):    Create a tuple containing all x in iterable
sorted(iterable):   Create a sorted list containing x in iterable
```

(Demo)

Zip

The Zip Function

The built-in **zip** function returns an iterator over co-indexed tuples.

```
>>> list(zip([1, 2], [3, 4]))
[(1, 3), (2, 4)]
```

If one iterable is longer than the other, **zip** only iterates over matches and skips extras.

```
>>> list(zip([1, 2], [3, 4, 5]))
[(1, 3), (2, 4)]
```

More than two iterables can be passed to **zip**.

```
>>> list(zip([1, 2], [3, 4, 5], [6, 7]))
[(1, 3, 6), (2, 4, 7)]
```

Implement **palindrome**, which returns whether s is the same forward and backward.

```
>>> palindrome([3, 1, 4, 1, 3])
True
>>> palindrome([3, 1, 4, 1, 5])
False
```

```
>>> palindrome('seveneves')
True
>>> palindrome('seven eves')
False
```


return all([a == b for a, b in zip(s, reversed(s))])

Using Iterators

Reasons for Using Iterators **An Data Abstraction Idea**

Code that processes an iterator (via **next**) or iterable (via **for** or **iter**) makes few assumptions about the data itself.

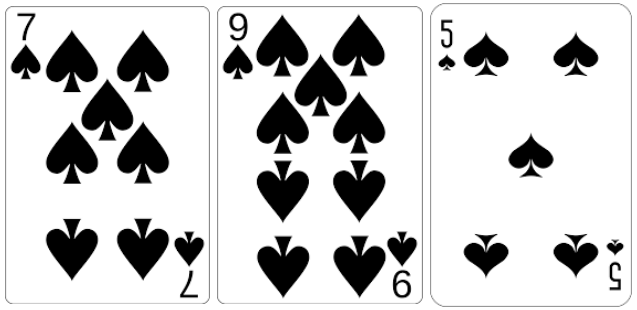
- Changing the data representation from a **list** to a **tuple**, **map object**, or **dict_keys** doesn't require rewriting code.
- Others are more likely to be able to use your code on their data.

An iterator bundles together a sequence and a position within that sequence as one object.

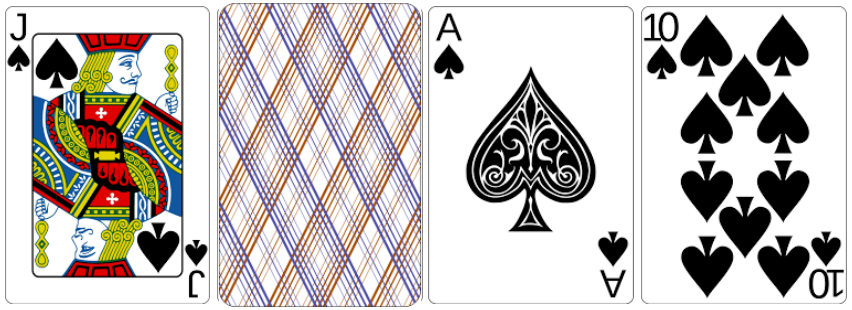
- Passing that object to another function always retains the position.
- Useful for ensuring that each element of a sequence is processed only once.
- Limits the operations that can be performed on the sequence to only requesting **next**.

Example: Casino Blackjack

Player:



Dealer:



(Demo)